
Radio Spectrum Measurement Science (RSMS) Operations

Outputs

- Measurements to determine move-times, detection thresholds, and aggregate emission characteristics of dynamic frequency selection (DFS) devices.
- Measurements and report on Land Mobile Radio (LMR) channel occupancy in Federal bands 162-174 MHz and 406-420 MHz.
- Measurements to address compatibility between radiolocation and maritime and aeronautical services in the bands 9000-9200 MHz and 9300-9500 MHz.

The Radio Spectrum Measurement Science (RSMS) Operations project performs critically needed radio signal measurements necessary for making decisions regarding Federal Government spectrum allocations. As stated under Departmental Organization Order 25-7, issued 5 October 1992, and amended December 1993, the NTIA Office of Spectrum Management (OSM) is responsible for identifying and making arrangements for measurements necessary to provide NTIA and the various departments and agencies with information to ensure effective and efficient use of the spectrum. The RSMS resides at ITS and is tasked to perform measurements in support of OSM as required to fulfill their mission. ITS, through the RSMS Operations program, provides OSM and the executive branch with radio spectrum data, data analysis, reports, and summaries. The four basic areas of RSMS are 1) spectrum surveys and channel usage, 2) equipment characteristics and compliance, 3) interference resolution and compatibility and 4) signal coverage and quality. In FY 2005, several different measurements were performed in support of the basic mission.

In August 2005, additional laboratory measurements were conducted to determine move-times and detection thresholds of dynamic frequency selection (DFS) devices. DFS is a method whereby a radio-local-area-network (RLAN) device, using the 5-GHz band for unlicensed operations, will detect the operations of radar and promptly evacuate the channel if the radar is present. Measurements were

conducted to determine if current DFS devices comply with specifications given in ITU-R M.1658. In FY 2004, testing was performed to demonstrate DFS proof of concept with a table of radar signals developed in conjunction with the Federal Communications Commission (FCC), industry, the Department of Defense (DoD), and NTIA. In FY 2005, additional testing was performed with a new set of radar signals developed by the DoD and NTIA to ensure radar operations in the 5-GHz band were protected. The test results will help determine whether this technology is able to move forward toward deployment in commercially available RLAN-type communication devices. In preparation for radiated measurements scheduled for FY 2006 to determine degradation of radar capabilities, aggregate radiated emissions of multiple DFS devices were also recorded at the Table Mountain facility located north of Boulder, Colorado, for the purpose of modeling these signals.

In the early part of FY 2005, measurements were conducted in the Washington, DC, area to measure and provide a report on Land Mobile Radio (LMR) channel occupancy in Federal bands 162-174 MHz and 406-420 MHz. This was part of NTIA's effort to improve the spectrum efficiency of Federal radio usage. Specifically, this effort was undertaken to help obtain data required to realistically design future possible shared trunked systems for Federal radio users and determine long-term usage trends by comparing results with previous measurements taken in the same location in 1986 and 1989. The measurements were made using new equipment and techniques developed at ITS that measure large areas of the spectrum and process it to obtain simultaneous signal levels of up to 480 individual LMR channels. These techniques provided faster measurements, but also allowed enhanced post-processing of the data to remove measurement defects.

In support of an agenda item at the International Telecommunication Union - Radiocommunication Sector's (ITU-R) World Radiocommunication Conference (WRC-07) to upgrade the status of the radiolocation service in the bands 9000-9200 MHz and 9300-9500 MHz to primary status, measurements were conducted in April of FY 2005. The



RSMS truck on site for the Land Mobile Radio measurements in Washington D.C. (photograph by I.L. Tobias).

measurements were designed to address compatibility between radiolocation and maritime and aeronautical services in the above mentioned bands. Waveforms of the radiolocation systems were generated and injected into the receiver of an SPS-73 radionavigation system to determine levels of degradation.

In support of a current review by NTIA/OSM of a spectrum support request that is contingent upon the in-band and out-of-band emissions of a Globalstar Mobile Satellite Service, measurements were made in late FY 2005 to characterize the emission levels of these devices. In addition, similar measurements were conducted to characterize emissions of a 1.9-GHz cellular handset. Of particular interest were the out-of-band levels received in the global positioning system (GPS) bands.

To investigate waiver applications to the FCC's ultrawideband Part 15 Rules permitting devices to employ swept frequency techniques, measurements

were conducted at the ITS Boulder Labs. The purpose was to provide an understanding of swept signals at the output of various filter bandwidths and to provide information to develop test procedures that could be used in compliance measurements.

In support of the ITU-R Joint Rapporteurs Group 1A/1C/8B regarding the international review of emission limits of radar systems, measurements were conducted in October of FY 2005 on several Japanese radars. The purpose was to collect emission characteristics to help with decisions in the development of the ITU limits which currently are similar to specifications stated in the U.S. Radar Spectrum Engineering Criteria (RSEC).

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